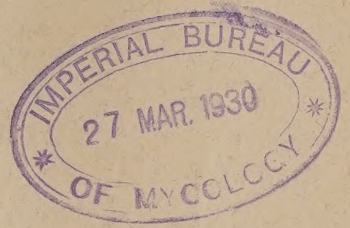


REPORT



ON THE

AGRICULTURAL DEPARTMENT

DOMINICA.

1928-29.

IMPERIAL
DEPARTMENT OF AGRICULTURE
FOR THE WEST INDIES



REPORT
ON THE
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TRINIDAD.

ISSUED BY THE IMPERIAL COMMISSIONER OF AGRICULTURE,
IMPERIAL COLLEGE OF AGRICULTURE.

1929.

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CONTENTS.

	PAGE.
STAFF OF THE DEPARTMENT	II
LETTER OF TRANSMITTAL	III
WORK IN THE BOTANIC GARDENS & OBSERVATIONS ON PLANTS	1
WORK IN THE NURSERIES & DISTRIBUTION OF PLANTS	2
PLANT IMPORTATIONS	4
WORK CONNECTED WITH INSECT PESTS & FUNGUS DISEASES ...	5
Report by Professor Ashby on His Visit to Dominica.	
REPORT ON THE LIME EXPERIMENT STATION, DOMINICA	7
COCOA EXPERIMENTS	11
LOAN BOARD	15
GOMIER STEWART TRUST ESTATE	15
DETAILS OF ADMINISTRATION	15
Expenditure and Receipts—Staff Changes, etc.—Additions and Repairs to Buildings—Correspondence—Plant and Seed Exchange—Agricultural Instruction and Visits to Estates—Laboratory Work.	
THE LIME INDUSTRY	18
LIME VARIETIES	20
MINOR INDUSTRIES	21
Fruit Industry—Cocoa—Coffee—Coconuts—Vanilla, including an article on curing—Nutmegs—Bay Oil.	
CHIEF EXPORTS	25
SUMMARY OF LEGISLATION AFFECTING CROPS	26
METEOROLOGICAL	27
Rainfall Returns for Dominica—Summary—Records kept at the Botanic Station.	
APPENDIX I.	30
Report on Peasants' Information Bureau—Produce Returns.	
APPENDIX II.	34
Rat Poisoning.	

STAFF OF THE AGRICULTURAL DEPARTMENT, DOMINICA.

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LETTER OF TRANSMITTAL

C.A. 584.

Acting Commissioner of Agriculture to the Administrator, Dominica.

TRINIDAD.

23rd September, 1929.

SIR,

I have the honour to transmit herewith the Report of the Agricultural Superintendent on the working of the Dominica Agricultural Department for the year ended March 31st, 1929.

2. The period covered by the report was one in which a severe hurricane was experienced which again caused severe injury to the Botanic Gardens and Experiment Station. These periodic storms throw very considerable additional work on the Staff of the Department.

3. Reference to the plant distribution list indicates that this work is being carried on on a big scale, and particularly that the work of budding and grafting the lime on the sour orange stock is being pushed energetically. This is the most important branch of the work of the Department at present. The presence of root disease and the destruction caused through storms will to a large extent be controlled when the lime plantations of Dominica are established on the sour orange stock.

4. Mr. Harcourt records that no useful purpose will be served by further recording the yield from the plots on the Lime Experiment Station. This station has to a large extent served its original purpose of demonstrating the possibilities of lime cultivation when carried on in a rational way. It is very desirable that the station be converted as soon as possible to an orchard of lime trees, budded on sour orange stock. The demonstration work could then be continued for the benefit of the present and future generations of planters.

5. The work of the Loan Board continues to receive the careful attention of the Staff of the Department.

6. During the year the Island was fortunate in receiving visits from Professor H. Clarke Powell of the Empire Marketing Board and of Professor Ashby of the Imperial Bureau of Mycology. The reports of these two specialists are made available to the planting community.

7. The Report of the Peasants' Adviser is included. Difficulties have been encountered during the year in several directions which will take time and experience to overcome. The handling of perishable fruit and vegetables is under the best conditions difficult, and without the assistance of such an organization as the Peasants' Information Bureau would be almost impossible.

8. The value of the chief product of the Island is, fortunately, extremely high and whilst the quantity fell off another 5,000 barrels, the values increased. The present high prices are likely to attract growers in other countries, and it behoves Dominica to push forward with all haste to renew their plantations with budded plants and to keep a watchful eye on the work of finding a lime that is immune to wither-tip.

9. In spite of a serious depletion of staff the work accomplished by the Department during the year is such as to reflect great credit on the remaining number.

I have the honour to be,

Sir,

Your most obedient servant,

G. A. JONES,

Acting Commissioner of Agriculture.

Imperial College of Tropical Agriculture.

REPORT ON THE AGRICULTURAL DEPARTMENT, DOMINICA.

FOR THE YEAR ENDED 31ST MARCH, 1929.

WORK IN THE GARDENS AND OBSERVATIONS ON PLANTS.

THE Botanic Gardens having made a rapid recovery from the damage sustained from the storm of 1926 were again badly damaged by a severe hurricane experienced on the 12th September, 1928. This storm was of great intensity and is generally considered as being the worst experienced in Dominica for many years. On the day following the hurricane the Gardens presented a deplorable sight, specimen trees being uprooted and twisted and torn or otherwise badly damaged. The work of clearing and renovating was commenced immediately, special care being given to pruning and treatment of exposed surfaces to guard against the possibility of fungus attack.

The Economic Section of the Gardens suffered the most. The much admired Nutmeg grove presented a sorry spectacle, for no fewer than 18 of these well developed trees were torn from the ground and 12 also very badly damaged. Although pruning back and propping has been resorted to, it is doubtful whether these trees will survive. The Cocoa plots were also badly damaged; two trees being blown over and 39 so badly damaged that it is doubtful whether many of them will recover. All the trees which were in full bloom at the time were practically stripped of their leaves and flowers. The low capacity of wind resistance by Para rubber trees (*Hevea brasiliensis*) was illustrated by the considerable damage they sustained. In one plot of 20 trees, 3 were uprooted, 10 damaged severely and the remaining 7 stripped of many of their limbs. Plots of *Cola acuminata* and Avocado Pears (*Persea gratissima*) were also badly knocked about and many trees were destroyed. The *Hydnocarpus* collection also suffered. Two trees of *Hydnocarpus anthelmantica*, and one tree of *Hydnocarpus Kurzii* were blown down, and all the trees were damaged to some extent.

Very good weather was experienced after the hurricane and the Gardens are making a wonderful recovery, especially the ornamental section.

Rainfall was fairly well distributed throughout the year and at no time was there a sustained dry period.

Of the plants of interest in the Gardens attention is called to the Palmyra palm (*Borassus flabelliformis*) a palm widely distributed throughout tropical parts of Asia. It presents a very healthy appearance and is now fruiting.

Mention should also be made of the Carnauba or Wax palm (*Copernicia cerifera*) of Brazil. It was introduced into Dominica about 25 years ago and appears to thrive under our local conditions. In view of the economic interest attached to this palm, a number of young plants have been raised for the purpose of establishing a large plot of these palms for experimental purposes.

Efforts to establish *Aleurites Fordii* in Dominica have so far not been very successful. In 1912, seed was obtained and ten plants raised. Nine plants were planted on the Morne and one in the economic section of the Botanic Gardens. Of these only two stunted specimens barely 6 feet in height remain. Plants raised from seed obtained in 1927 also failed to make progress. In view of the general effort to establish Empire supplies of tung oil, which is derived from the trees of *Aleurites Fordii* and *Aleurites montana*, and the belief that these trees should grow further south than in its natural habitat in China, which lies between 26 degrees and 34 degrees North latitude, further seedlings have been raised of *Aleurites Fordii*, for trial in selected localities.

The Candle-berry tree (*Aleurites triloba*) appears suited to the wet districts of Dominica, and fine specimens are to be observed on Blenheim estate and at Atkinson. The owner of the tree at Atkinson states that he extracts the oil from the seeds and uses same for cooking purposes. Many self-sown seedlings are observed in the vicinity. The specimens in the Botanic Gardens do not present such a happy appearance.

The plant of *Dombeya Wallichii* received from Kew in 1926 is growing well. It has flowered profusely and attracted considerable attention. Other plants received from Kew

WORK IN THE NURSERIES.—DISTRIBUTION OF PLANTS.

at the same time which have flowered and are in demand by garden lovers are *Oxalis dispar*, *Pentas coccinea*, *Crossandra undulæfolia* and *Strobilanthus isophyllus*.

Flowering for the first time was observed of the *Sapucaia* or Paradise nut (*Lecythis Zabucajo*) the trees being 16 years of age. The flowers, however, did not set seed. These trees are growing in the Morne experiment station and show a decided variation in foliage. They are deciduous and have attained a height of 26 feet.

WORK IN THE NURSERIES AND DISTRIBUTION OF PLANTS.

In view of efforts made towards the diversification of the Island's industries on account of the serious blow afforded the lime industry through the incidence of Withertip disease, and later through the devastating effect of the hurricane upon the seedling West Indian lime and the epidemic of root disease which followed, the work of plant propagation and distribution ranks among the most important duties of the Agricultural Department at the present time.

Full advantage is being taken of the Free Plant Distribution Scheme which was outlined in last year's report, and a perusal of the table of plants distributed, either free or at a greatly reduced rate in the instance of budded or grafted citrus, will show that the output from the Department's nurseries has progressively increased and also serves to illustrate that planting operations on a considerable scale are being carried out in Dominica.

The Department is now in a position to meet the demand for all economic plants with the exception of that for budded citrus, of which the lime is principally required.

The months of April and May, which are usually fairly dry have proved to be our best months for budding operations, and it was not anticipated that any serious difficulty would present itself in connection with the budding of the West Indian lime during this particular period, although efforts had not been very successful at other times of the year. However in 1928 no sustained dry period was experienced and particularly showery weather was experienced in April and May. The result was that the successful budding of the lime proved very difficult, 30% being about the average of successes obtained. Similar results were obtained by one or two planters who had established small estate nurseries. The situation occasioned the Department grave concern, for existing seedling lime cultivations were rapidly succumbing to the ravages of root trouble and it was obvious that the salvation of the lime industry depended upon the speed with which planters could be supplied with lime plants on the roots of the sour orange and replant those areas which had become devastated through hurricanes and disease. It has been demonstrated that the lime on the roots of the sour orange is very resistant to high winds and root troubles to which the lime is so susceptible when growing on its own roots. Other advantages have already been emphasized in the Annual Reports of the Department.

It therefore appeared obvious that the successful budding of the lime was controlled by the weather experienced during the months previously mentioned, and in view of the possibility of similar unfavourable weather conditions prevailing in the future, the Department was faced with a difficult and urgent problem.

In the past the West Indian lime has always been propagated from seed and no perceptible variation has ever been observed during the many years it has been growing in Dominica.

Experiments were therefore at once conducted with a view of ascertaining if grafting by approach the seedling lime and the seedling sour orange would prove a more successful method of propagation. As a result of these experiments I found that it was comparatively easy to get 90% to 100% successes and a well developed plant ready for the field in less time than it would take in the case of successful budding and incidentally in far greater numbers. Furthermore the fact was illustrated that grafting by approach could be successfully performed practically throughout the year. This method of propagation may be considered new to Citrus, as it is not applied, nor should it be, in the instance of grapefruit and oranges. In the case of the West Indian lime, however, a seedling and incidentally a species, is perpetuated on a stock of proven compatibility, such seedling species have shown no obvious degree of variation during the many years it has been grown from seed. The actual process is simple. Selected seedlings of sour orange and lime are planted side by side in the nursery bed and approach-grafted about ten inches from the ground. When the stems are united, the lime is severed from its roots, which are then removed and the grafted plant continues in the nursery until ready for the field.

WORK IN THE NURSERIES.— DISTRIBUTION OF PLANTS.

Budding having proved to be so slow and uncertain in result, and it being a matter of urgency in supplying large numbers of lime plants on the roots of the sour orange, grafting will be continued when weather conditions are unsuitable for the budding of the lime.

We have in the Department's experiment station bearing lime trees budded on the sour orange, which prove this stock suited to the lime and which are superior in every respect to the seedling. No bearing grafted lime plants exist as a guide concerning any advantages or otherwise that they may have, when compared with the budded article. Budding, however, is a form of grafting and I know of no reason why grafting by approach should not be applied in the instance of the West Indian lime. It has been suggested that the graft union may not prove strong enough to withstand the high winds sometimes experienced in Dominica. It is true that we have no proof that the strength of union will be all that is desired in the case of hurricanes, but the fact that other plants similarly grafted in Dominica have successfully withstood such storms is a strong indication that there should be little concern on this point, especially as very fine unions are obtained in the nursery, much better in fact than is usually obtained in this class of work. Another point in favour of grafting is the fact that a well developed plant can be obtained ready for the field in about the same time as a seedling and earlier than in the case of budding. No difficulty has been experienced in budding grapefruit and oranges. It is only with the West Indian lime that we have had trouble, but in support of my view already expressed this difficulty may be attributed to weather conditions. It should be mentioned that April and May of this year (1929) were fairly dry months and during this time no difficulty was experienced in budding the West Indian lime.

By adopting both methods of propagation, i.e. budding when conditions are favourable and grafting should they not prove so, it is anticipated that the demand for budded or grafted lime plants will be fully met next year. Additional land has been acquired by the Department for general nursery work, in order that the Department's nurseries in Roseau might be used exclusively for lime propagation, as they are favourably situated for the purpose. Approximately 100,000 selected sour orange stocks have been bedded out, in addition to a considerable number distributed to estate nurseries.

I have dealt rather fully on lime propagation in order to explain our difficulties and measures adopted for their amelioration.

Other economic plants such as Coconuts, Cocoa, Coffee, and Nutmegs are much more easily propagated and the Department is in a position to cope with the demand. There is a steady demand for these plants, especially Coffee and Cocoa, as will be observed by the numbers distributed. Although the seven country coconut nurseries have been maintained, there is a decided falling off in the demand for these plants. This is not surprising, as the peasant proprietors have not the area of land to warrant their planting this or any one crop, nor in the majority of cases is their land suitable for the growing of coconuts. A point of interest, and of importance, is the revival of the interest in growing coffee. Larger planters as well as peasants are interested and are steadily planting up their lands, especially those situated outside the economic range for the growing of the West Indian lime.

With reference to the care of the plants after distribution, I would point out that it is impossible to keep all under observation, but it is observed that the peasants are continuing with their mixed garden style of cultivation, and the peasant proprietors, practically the same but on a larger scale, and paying more attention to establishing permanent crops. The hurricane of September last year was, however, responsible for considerable damage even to young cultivations.

It has been a rule that planters who are in a position to pay for plants should do so, but it is difficult to know where to draw a line of distinction; consequently the Department decided to distribute plants free to all with the exception of budded plants, provided assurance was given that they would be well cared for. This decision had the effect of stimulating the efforts of the planters, inasmuch as the demand for most plants was readily met from stocks left over after the peasantry had been supplied. The demand for plants is now principally from the planter and this form of practical assistance is much appreciated. Plants distributed to the larger growers are usually better tended and a healthy demand from this direction indicates that serious efforts are being made to arrest Dominica's agricultural decline.

I attach a list showing the number of economic plants distributed during the past year and from the time the free plant distribution scheme commenced in 1927.

PLANT IMPORTATIONS.

PLANT DISTRIBUTION.

<i>Name of Plant.</i>	<i>Total from 1.1.27 to 31.8.28.</i>	<i>Total from 1.9.28 to 31.8.29.</i>	<i>Total from 1.1.27 to 31.8.29.</i>
Washington Navel Orange	1,720	824	2,544
Grapefruit	2,521	782	3,303
Portugal Orange	68	18	86
Mandarin	33	6	39
Sweet Lime	29	5	34
Tangerine	47	7	54
Seedling Limes	39,917	303	40,220
Budded & Grafted Limes	865	2,753	3,618
Limes (Other varieties)	2,931	736	3,667
Budded Lemon	569	400	969
Coconuts	14,939	13,632	28,571
Cocoa	14,057	14,382	28,439
Coffee	48,444	34,222	82,666
Grafted Mangoes	363	225	588
Nutmegs	6,277	1,715	7,992
Tobacco	6,282	—	6,282
Mangosteen	281	69	350
Sour Orange (Stocks)	1,975	2,712	4,687
Pawpaw	1,910	—	1,910
Tannias	6,989	18,431	25,420
Camphor	363	—	363
Mango Seedlings	74	18	92
Black Pepper Cuttings	494	50	544
Onion Plants	13,600	—	13,600
Cane Cuttings*	—	26,473	26,473
Miscellaneous Plants & Cuttings	6,390	1,254	7,644
	<u>171,138</u>	<u>119,017</u>	<u>290,155</u>

* Previously included under Miscellaneous.

PLANT IMPORTATIONS.

Plant introductions made during the year were as follows :—

SEEDS :—

Corypha umbraculifera

Cassia javanica

Homalium tomentosum

Adenanthera pavonina

Lagerstræmia speciosa

Corypha utan

Arenga Saccharifera

Carica papaya

Crotolaria juncea

„ *anagyroides*

„ *usaramoensis*

„ *sericea*

„ *striata*

Cajanus indica

(var. Arahara, Hawaii, etc.)

PLANTS :—

Pimento officinalis

Ipomœa batata (var. Jersey Sweet)

WORK CONNECTED WITH INSECT AND FUNGUS PESTS AND THEIR CONTROL.

During the year under review Red Root disease of limes continued to be very active and resulted in the loss of thousands of bearing lime trees. The disease is very widespread and practically every lime estate is affected. Efforts to arrest the spread of the disease proved of no avail. The situation became so serious that the Commissioner of Agriculture approached the Director of the Imperial Bureau of Mycology on the matter and enquired whether the Bureau would be prepared to send Professor S. F. Ashby, a member of its staff who has had special experience in connection with plant diseases in the West Indies, to Dominica in order to investigate the situation and to advise on what measures should be undertaken to eradicate the disease. The Managing Committee of the Bureau decided that, in view of the very serious nature of the outbreak, Professor Ashby's services should be made available for the purpose proposed.

Professor S. F. Ashby arrived in Dominica on February the 7th and left for Antigua on the 3rd March.

During his stay in Dominica the Professor visited nearly all the estates where the disease was most active and before leaving the Island, addressed a general meeting of the Dominica Agricultural and Commercial Society. Briefly his investigations showed that there was no new or actively parasitic fungus disease attacking the roots of limes. The weakly parasitic soil-inhabiting fungi which have probably long been established in the soils of Dominica were enabled to attack lime trees following the injuries inflicted on the lime trees by the storm of 1926, aided by the absence of a dry season in 1927, and these have been responsible for the wholesale losses in lime plantations. Mr. Ashby was of opinion that further injury has been caused by the storm of 1928, but that the normal dry season which followed in 1929 would not enable the fungi to affect the lime trees as seriously as was the case in 1927.

It has been suggested that since there would probably be a shortage of budded limes for planting, as it takes some time to raise this class of plant, the Agricultural Department should again raise seedling limes for distribution.

The Department, however, very much doubts whether such a course would be advisable and is of opinion that the time thus saved would be so little that it would not compensate for the risk of storm damage and the subsequent root troubles which appear in the case of the seedling lime. Furthermore, some planters have endeavoured to re-establish the seedling lime in diseased areas and have been far from successful.

The Department therefore will concentrate on the production of grafted and budded plants on the sour orange stock. Professor Ashby's official report is issued herewith.

REPORT OF PROFESSOR ASHBY'S VISIT TO DOMINICA.

Some twenty-three days were spent in Dominica investigating the so called red root disease of limes. The dying out of the trees had begun to be noticeable on some plantations in the coastal area towards the end of 1926, becoming gradually more widespread and more intense during the early months of 1927. The failure appears to have been at its height during that year, but continued during 1928 and up to the time of my visit. The intervening storm of September, 1928, introduced a complicating factor into the situation. Losses due to the death of the trees had been serious at a few of the plantations on the Leeward Coast where production had continued to be economic in spite of the presence of withertip. Professor Briton-Jones spent some ten days investigating the disease in July, 1927 (Annual Report of the Agricultural Department, 1927-28, pp. 3-11.) He recorded the failure as a complex effect due to a sum of contributing factors, among which he mentioned the storm of 1926 and the protracted wet period following it. He noted the frequent presence of *Sphærostible repens*, B. and Br., in the dead roots, but did not regard it as an important factor in the causation of the disease. My observations were restricted to cultivations on the Leeward and South Coastal areas where crop production was still economic.

No actively parasitic fungus was detected on the roots or other parts of lime trees dead, dying or affected by the disease. The fungi found—*Sphærostible repens*, B. and Br.,

REPORT OF PROFESSOR ASHBY'S VISIT.

Fusarium sp., *Phomopsis* sp., *Botryodiplodia theobromæ*, Pat., &c —must be regarded as saprophytes or weak to very weak parasites on roots or aerial parts of trees dead, dying or lowered in vitality by other causes. There is no reason to think that any of the fungi found are new to the island and it is very probable that all have been present since the cultivation of limes was begun.

The dominant cause of the dying out of seedling lime trees during the last two years appeared to be:—

- (1) The storm of July, 1926, which caused internal and external injury by strain and twisting of the shallow-rooted seedling lime trees over a considerable area, but especially in the more exposed situations.
- (2) The protracted wet weather following the storm which extended through 1927, no dry season occurring during that year.

The lack of opportunity for the soil to dry out doubtless resulted in deficient aeration and a diseased condition of the roots promoting probable entrance into, and extension within the tissues injured by the storm, of some weakly parasitic soil-inhabiting fungi.

Sphærostible repens (the conspicuous rhizomorphs of this fungus in the cortex and on wood of roots gave rise to the common name of the disease) was of very frequent occurrence on trees in differing situations (hillsides and flats) and on soils varying in character. This fungus was found on lime roots in Dominica by South in 1911 (Annual Report of the Agricultural Department, 1912-13, p. 9), and mention was made of it in association with diseased lime roots on a number of occasions in Reports of the Department during the succeeding ten years. It has been recorded frequently in association with root disease of woody crop plants in the Eastern tropics, but inoculations with it have yielded only negative results.

Further injury in Dominica has been done by the storm of September, 1928, and a number of trees will doubtless die in consequence during the present year, but as the dry season has been normal the severity of the disease is not likely to approach that of 1927. The isolation of spots where trees had died or were dying by trenches, based on the assumption that an actively parasitic fungus was present capable of spreading through the soil or from the roots of affected to those of adjacent trees, has been given up as the results were negative. The exposure and removal of dead or dying main lateral roots where trees are showing early signs of failure in single limbs is recommended for trial, as some planters claim beneficial results from such treatment, although others have had no success.

I am in agreement with Professor Britton-Jones that the budding (or grafting) of lime on sour-orange stocks (other stocks are also under trial) is the only effective remedy for avoiding immediate and deferred loss due primarily to storms. This work is being actively undertaken by the Agricultural Department and on two of the leading estates where nurseries have been established. It is very gratifying to note that Mr. Green of Roseau, the owner of Sherwood and Green Hill Estates where the cultivation of seedling limes had become uneconomic owing to withertip, has planted up on those properties the immune varieties, Tahiti, Bear's Seedless and Woglum's lime, and certain crosses with the common lime, all having been made available to him by the Agricultural Department. As he is vitally interested in overcoming withertip, the kinds mentioned will receive excellent opportunity to show their worth, and definite data in regard to the quality of the fruit may be expected this year or in 1930.

The losses caused by withertip and so called red roct disease have fortunately been compensated temporarily by the phenomenal market value of lime oil and the consequent increased local prices of ripe limes and fresh juice. This situation should enable the estates to face the expense of planting budded or grafted limes with a view of insuring the future against storm damage.

A lecture on the root disease of limes was given before the Agricultural and Commercial Society before leaving the Island.

Gumming disease was detected on three old varieties of sugar-cane at a lime estate. Two of the varieties were Purple Transparent and Caledonia Queen (Cavengerie). It was recommended that good resistant seedling canes of recent origin ('B.H. 10.12, S.C. 12/4 &c.), be obtained and grown by the Department for distribution.

LIME EXPERIMENTS.

REPORT ON THE LIME EXPERIMENT STATION, DOMINICA.

This Station was started in April, 1913, and the first planting of limes was made in July of the same year. A statement showing the expenditure and the receipts during the sixteen year period is given below :—

	Expenditure.			Receipts.		
	£	s.	d.	£	s.	d.
1913-1914... ..	50	0	0	17	9	7
1914-1915... ..	70	0	0	61	1	5
1915-1916... ..	120	0	0	86	9	10
1916-1917... ..	175	0	0	121	2	11
1917-1918... ..	175	0	0	180	12	2
1918-1919... ..	200	0	0	233	12	8
1919-1920... ..	250	0	0	625	6	7
1920-1921... ..	320	0	0	741	8	2
1921-1922... ..	400	0	0	456	8	3
1922-1923... ..	350	0	0	423	1	2
1923-1924... ..	350	0	0	515	3	5
1924-1925... ..	332	10	8	662	3	9½
1925-1926... ..	341	3	4	671	10	10
1926-1927... ..	334	17	3	1,135	7	4½
1927-1928... ..	336	17	7	1,018	13	2½
1928-1929... ..	326	8	5	1,159	16	10
Cost of manures to date.. ..	575	0	0	/		
Cost of drainage (from special Grant) ..	48	3	0			
Head Labourer's house	60	0	0			
Shed for housing mill, etc.	100	0	0			
Watchman's House	12	10	0			
Total	£4,927	10	3	£8,109	8	2½

Supervision, always a considerable charge, has cost nothing in this instance, the work being done by the Agricultural officers; nor has any charge been included for storm damage, which was administered as a separate item over all the department's acreage. The reduction in yield for this year, which was mainly due to the hurricane effects, was more than compensated by the higher prices obtained. A fair amount of assistance has also been given by the Agricultural pupils who have been under training during recent years. These pupils were from time to time engaged in sowing green dressings, applying manures, pruning the trees and other work of a light character.

It should be clearly understood that the figures of expenditure given above not only maintain the present bearing acres of limes, which includes the gathering, but also covers the cost of upkeep of about five acres of young lime cultivation, eight acres of young coco-nuts, and a further area of three acres consisting of grapefruit, camphor, avocado pears, etc.

During the sixteen years of its existence the Experiment Station, so far as the disposal of the crop is concerned, has been in the position of a small grower; that is, the ripe and green limes have had to be sold in the open market at the current ruling prices. For the

LIME EXPERIMENTS.

purpose of record a table has been prepared which shows the local market rates per barrel of fruit since 1914-1915 :—

RIPE LIMES.

Year.	Barrels of Limes.	Amount received.			Average Rate per barrel.		
		£	s.	d.	£	s.	d.
1914-15	222	61	1	5	5	6	
1915-16	315	86	9	10	5	6	
1916-17	541	121	1	1	4	5½	
1917-18	649	180	12	2	5	6¾	
1918-19	1,070	221	2	8	4	1½	
1919-20	1,589	498	1	6	6	5½	
1920-21	2,571	688	17	4	5	4½	
1921-22	2,485	456	8	3	3	8	
1922-23	2,916	423	1	2	2	10¾	
1923-24	2,502	453	15	5	3	7½	
1924-25	2,684	629	11	9½	4	3¾	
1925-26	2,792½	630	7	6	4	6	
1926-27	2,475	1,053	3	8½	8	6½	
1927-28	2,239	993	18	11½	8	9¼	
1928-29	1,587½	1,074	1	10	13	6½	

GREEN LIMES.

Year.	Barrels of Limes.	Amount received.			Average Rate per barrel.		
		£	s.	d.	£	s.	d.
1918-19	10	12	10	0	1	5	0
1919-20	191	127	5	1	13	3¾	
1920-21	55½	52	10	10	18	11	
1921-22	—	—	—	—	—	—	—
1922-23	—	—	—	—	—	—	—
1923-24	66	61	8	0	18	7	
1924-25	40	32	12	0	16	3½	
1925-26	42	41	3	4	19	7½	
1926-27	66	82	3	8	1	4	11
1927-28	20	24	14	3	1	4	8½
1928-29	81¾*	85	15	0	1	1	0

The Experiment Station crop for the year under review was 1,587½ barrels of ripe limes and 81¾ barrels of green limes, most of which were sold in the local market and realised the sum of £1,159. 16. 10. The total crop for the year was 1,701 1/6 barrels of fruit, a decrease on that of the previous year.

* Approximately 32 barrels were also distributed for exhibition and advertisement purposes.

MANURIAL EXPERIMENTS.

MANURIAL EXPERIMENTS WITH LIMES.

The lime cultivations in the experiment station were severely damaged by the hurricane of the 12th September, and of a total of 2,547 bearing trees, 111 were blown out of the ground, 600 were blown over and required propping and practically replanting, also 487 were very badly damaged, making a total of 1,198 seriously affected. All trees were defoliated and most of the mature and immature fruit lost. Root disease appeared very active after the hurricane and large numbers of trees are dead or dying in consequence. So many trees are missing from the plots that the Department is now compelled to bring these manurial experiments to a close.

The Department's Annual Report for the year 1912-13 records the inception of these experiments and the subsequent reports give the expenditure, receipts, and the carefully kept crop records, with valuable observations on the accumulating data.

The fact that these observations have already been fully chronicled and are therefore familiar to the reader of these reports, eliminates the necessity of a detailed summary being given beyond emphasis of a few pertinent points.

The main manurial experiments carried on consisted of five plots three times repeated, two series with young limes, and one series with old limes. They were as follows:—

- A. Complete manure of nitrogen, phosphates, and potash.
- B. Control. No manure.
- C. Mulch of grass, 5 tons per acre.
- D. Nitrogen and potash.

^E In each case the nitrogen was originally applied in the form of Swift's manure, (8 per cent ammonia) at the rate of 4 cwt. per acre, but for a period of three years this manure could not be obtained, and the equivalent in the form of Cotton Seed meal was applied instead. During the past three years dried blood, (14 per cent ammonia) has been used.

The phosphatic requirements of the plots are furnished in the form of basic slag, applied at the rate of 4 cwt. per acre, and the potash by sulphate of potash at the rate of 1½ cwt. per acre. During 1920-21 neither of these manures could be obtained and the falling away of the crop during 1921-22 is in some measure due to the lack of these fertilizers. During recent years sulphate of potash was again available, and as basic slag could not be obtained, 16 per cent acid phosphate was used in its place.

The mulch applied is mainly in the form of lemon grass, supplemented by leaves and young shoots of *Gliricidia maculata*. Both forms of mulch are especially grown on what would otherwise be waste grounds in the vicinity of the plots. This system of utilising odd corners, steep hill-sides, and the banks of streams for growing material for application to cultivated areas is strongly recommended in Dominica.

These figures give the actual yield per three plots of a kind, grouped together over the eleven years covering the period when the trees reached the bearing stage until the 31st March, 1928, marking the end of the keeping of crop records. An idea of the effects of the various manures and cultural measures carried on may be gained from the figures given below. Each plot being of ⅓ acre, the yields shown below are therefore for ⅓ of an acre.

	Barrels of fruit.	Calculated yields per acre per annum over 11 years.
Control	1,324	160
Complete manure	1,930½	238 4
Mulch	1,826¾	221
Nitrogen & Phosphates	1,914	238 1
Nitrogen & Potash	1,879	226 8

The first observation to be made is that the manured and mulched plots have yielded over 500 barrels more than the control.

The second is the high yield of the mulched plots, which although falling slightly below those of the plots to which concentrated fertilisers have been applied, certainly puts forward a forceful argument for its employment as a method of dispensing with expensive artificial manures.

MANURIAL EXPERIMENTS.

The increased yield of the manured plots appears inadequate, in comparison, to justify large purchases of these manures when the practicability of the abundant supply of mulch material is considered.

Account must also be taken of the effect of the continual application of artificials on the life of the tree, whereas the physical improvement of the soil by the use of mulches cannot be over emphasised.

Thirdly it will be noted that the slightly higher yield comes from the employment of a complete manure.

Fourthly that although a full yield was not attained until about the fourth year, when withertip commenced to take its yearly toll of fruit and flowers, the average for the eleven years in the case of the complete manure plots work out at over 230 barrels per acre.

Under the afore-mentioned circumstances this yield is high and considerably above the average estate yield, and demonstrates what can be achieved when proper methods of cultivation and judicious manuring are employed.

The yields of the Nitrogen and Phosphates, and Nitrogen and Potash plots do not show much difference.

Three new series, each consisting of three plots, were started early in 1921. The area of the plots was slightly over a $\frac{1}{4}$ acre each. The treatment repeated in each series was as follows :—

1. Ready mixed complete fertilizer (8% nitrogen, 10% phosphates and 4% potash) at the rate of 500 lbs. per acre (with mulch $2\frac{1}{2}$ tons per acre.)
2. Control. (no fertilizer or mulch).
3. Ready mixed complete fertilizer, (8% nitrogen, 10% phosphates and 4% potash) at the rate of 1,000 lbs. per acre (with mulch $2\frac{1}{2}$ tons per acre).

The actual yield per three plots of a kind grouped together covering the ^{Seven}~~eleven~~ year period 1921-22 to 1927-28 was as follows :—

Complete fertilizer 500 lbs per acre with mulch	801 Barrels of fruit.
Control	724 „ „ „
Complete fertilizer 1,000 lbs per acre with mulch ...	850 „ „ „

Another important experiment commenced in 1914 was with the seedling and spineless limes budded on the sour orange stock together with the lime on its own root stock.

An acre was divided into $\frac{1}{4}$ acre plots, two plots of common limes budded on sour orange stocks; one plot of spineless limes, and one plot of seedling limes.

TREATMENT.

During 1917-18 and 1918-19 the trees in each plot received a small dressing of organic nitrogen at the rate of 4% per acre. During the first three years of their existence, No. 1 budded plot was grown with Tephrosia as a green dressing whilst No. 2 budded plot was grown in the usual way with weeds and grass and was occasionally weeded. The spineless limes had green dressings of horse beans and the seedling limes were clean weeded.

Early in 1919-20 each plot received a complete manure of nitrogen, phosphates and potash. It is intended to maintain this series as complete manure plots. The crop yields for the ^{Seven}~~eleven~~ years since planting is summarised as follows :—

	^{Seven} Eleven -years yield.	Average yield per acre per annum.
Spineless Limes budded on Sour Orange stock	332	120
Common Limes budded on Sour Orange stock No. 1.	690	251
Common Limes budded on Sour Orange stock No. 2.	654	239
Common Limes on own roots ...	446	162

COCOA EXPERIMENTS.

Valuable information is obtained by the results of this experiment. Firstly the greatly increased yield of the budded over the ordinary seedling lime. Secondly to account for the increase of Budded No. 1 over Budded No. 2 the conclusion is reached that the early treatment given the former, by covering the interplanting space with a suitable green dressing while No. 2 was subjected to the usual practice of allowing this land to be occupied with grass and weeds, would account for the relatively higher yield of No. 1.

It has also to be noted that Budded No. 1 reached its maximum yield during 1922-23 when the calculated yield per acre was as high as 528 barrels. The following year was the first complete year under "Withertip" conditions and the calculated yield per acre of this plot fell to 236 barrels. A like fall in a greater or lesser degree is to be noted in the recorded yields of all the plots under experiment. The high susceptibility of the Spineless lime to Withertip disease coupled with the fact of its being ordinarily a poorer bearer rules out this variety from an economic standpoint.

GENERAL OBSERVATIONS.

The main conclusions to be drawn from these experiments are two:—

1. The use of the Sour Orange stock for increased yields.
2. The economic and manurial importance of mulch in the cultivation of the lime.

With the cessation of these experiments the point arises to what instructive or experimental use can the plantations now be placed. For the time being it is proposed to keep record of its cost of maintenance and revenue, maintain a high cultural level, and to replant and re-establish the areas devastated by hurricane and root disease as speedily as circumstances render this possible by limes propagated on Sour Orange stock. An example thus set cannot fail to be of use and benefit to those whose confidence in the lime has been shaken through the root disability of the seedling.

Plots of grafted and budded limes, also of limes on rootstocks other than the sour orange, will be established for observation purposes.

From these plots, it is hoped that useful data will become available, such as the time taken from the nursery stage to full bearing, the comparative yields on the various stocks and possibly resistance to minor diseases, as well as to withertip and red root. In the event of unforeseen adverse circumstances, for example excessively wet or dry seasons, hurricanes, etc., the advantages or otherwise of each type of plant may also be thoroughly tested in these respects.

COCOA EXPERIMENTS.

The old series of manurial experiments discontinued in 1922 were put under a different series in the same year, the new treatment being based on the information supplied by the earlier results. The latter strongly confirmed the belief that the use of complete fertilisers with mulches or pen manure is the basis of economic practice in successful cocoa production. The new series, of which the details of treatment and yields are given below, were laid down with a view of attempting to ascertain the relative requirements of cocoa in respect to nitrogen, phosphates, potash and humus, and the forms in which these elements may be best supplied in Dominica.

The plots fall naturally into two main groups. Plots I—VII are on comparatively flat land, while plots VIII—X are on hill slopes. In the first group, however, three sub-groups with smaller divergence of soil and situation exist and are therefore comparable. The grouping is indicated by horizontal lines in the first table.

COCOA EXPERIMENTS.

MANURIAL EXPERIMENTS WITH COCOA.

The following table shows the area of each plot, treatment per plot, and estimate per acre.

<i>Plot No.</i>	<i>Area, Acres.</i>	<i>Treatment per plot.</i>	<i>Treatment per acre.</i>
1.	0.29	261 lb. Mixed fertilizer 8-10 4. Without mulch.	900 lb. Mixed fertilizer 8-10-4.
2.	0.36	162 lb. Nitrapo, 200 lb. Acid phosphate.	450 lb. Nitrapo, 555½ Acid phosphate.
3.	0.28	126 lb. Nitrapo, 157 lb. Acid phosphate, 1,568 lb. Mulch.	450 lb. Nitrapo, 560½ Acid phosphate, 2½ tons Mulch.
4.	0.37	4,144 lb. Mulch.	5 tons Mulch.
5.	0.29	261 lb. Mixed fertilizer 8-10-4 3,248 lb. Mulch.	900 lb. Mixed fertilizer 8-10-4 5 tons Mulch.
6.	0.25	75 lb. Nitrapo, 118 lb. Acid phosphate, 1,400 lb. Mulch.	300 lb. Nitrapo, 472 lb. Acid phosphate, 2½ tons Mulch.
7.	0.25	150 lb. Cotton seed meal, 118 lb. Acid phosphate, 25 lb. Potash.	600 lb. Cotton seed meal, 472 lb. Acid phosphate. 100 lb. Potash.
8.	0.414	248½ lb. Mixed fertilizer 8-10 4	600 lb. Mixed fertilizer 8-10-4
9.	0.373	223 lb. Mixed fertilizer 8-10-4	400 lb. Mixed fertilizer 8-10-4
10.	0.40	4,177 lb. Mulch. 160 lb. Mixed fertilizer 8-10 4 200 lb. Lime, 1 ton Mulch.	5 tons Mulch. 400 lb. Mixed fertilizer 8-10-4 500 lb. Lime, 2½ tons Mulch.

COCOA EXPERIMENTS.

The following tables show the yields in each of the six years since the new series was commenced. The yields are given in terms of pounds of wet cocoa per plot and per acre, and cured pounds per acre. An average of 38 lb. cured was obtained from 100 lb. wet cocoa,

Year.	Plot 1.		Plot 2.		Plot 3.		Plot 4.		Plot 5.	
	261 lb. Mixed Fertilizer (8-10-4) No Mulch.		162 lb. Nitrapo. 200 lb. Super Phosphate.		196 lb. Nitrapo. 157 lb. Super Phosphate. 1,569 lb. Mulch.		4,144 lb. Mulch.		261 lb. Mixed Fertilizer. (8-10-4.)	
	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.
1922-23										
Wet Cocoa.	1,010	3,514	1,014	2,816½	663	2,368	1,240	3,351	1,096	3,779
Cured		1,370		1,098		1,028		1,306		1,473
1923-24										
Wet Cocoa.	1,322	4,558	1,152	3,200	936	3,343	1,309	3,510	1,234	4,255½
Cured		1,776		1,248		1,303		1,368		1,659
1924-25										
Wet Cocoa.	1,188	4,096	1,023	2,841½	797	2,846	1,236	3,340½	1,035	3,569
Cured		1,597		1,107		1,109		1,302		1,331
1925-26										
Wet Cocoa.	1,018	3,510	769	2,136	583	2,082	1,006	2,718	855	2,878
Cured		1,333		811		791		1,032		1,093
1926-27										
Wet Cocoa.	1,028	3,544	1,032	2,866	781	2,789	842	2,275	1,002	3,489
Cured		1,346		1,089		1,059		864½		1,325
1927-28										
Wet Cocoa.	807½	2,784	968	2,888	1,178½	4,208	1,169	3,159	926	3,193
Cured		1,057		1,097		1,599		1,200		1,211

COCOA EXPERIMENTS.

Year.	Plot 6.		Plot 7.		Plot 8.		Plot 9.		Plot 10.	
	75 lb Nitrapo. 118 lb. Superphos. 1,400 lb. Mulch.		150 lb. Cotton Seed Meal 118 lb. Super Phosphate.		248 lb Mixed fertilizer. (8-10-4).		223 lb. Mixed fertilizer (8-10-4) 4,177 lb. Mulch.		180 lb. Mixed fertilizer 200 lb. Lime 1 Ton Mulch.	
	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.
1922-23										
Wet Cocoa.	918	3,672	754	3,016	650	1,570	1,177	3,155½	961	2,402½
Cured		1,432		1,176		612		1,230		936
1923-24										
Wet Cocoa	986	3,944	902	3,608	745	1,799½	1,049	2,789½	1,005	2,512½
Cured		1,538		1,407		701		1,087		979
1924-25										
Wet Cocoa	886	3,544	610	2,240	736	1,777½	1,138	3,051	867	2,167½
Cured		1,382		873		693		1,189		845
1925-26										
Wet Cocoa.	819	3,276	500	2,000	830	2,004	1,259	3,378	801	2,002
Cured		1,244		760		761		1,283		760
1926-27										
Wet Cocoa.	822	3,288	659	2,636	777	1,877	1,259	3,375	922	2,305
Cured		1,249		1,001		711		1,282½		875
1927-28										
Wet Cocoa.	719	2,876	490	1,960	610½	1,474	1,861	4,989	797½	1,993
Cured		1,092		744		560		1,895		757

DETAILS OF ADMINISTRATION.

LOAN BOARD.

The Loan Board functioned as usual throughout the year and the number of estates obtaining financial assistance from the Board continues to increase. It is a general principle, that no matter what amount is stipulated for any loan, money is only advanced in such amounts and at such times as the board considers expedient. Furthermore, it is a condition that the work of cultivation undertaken with respect to every loan should be inspected on behalf of the Board, at intervals of not less than six months, by a senior officer of the Agricultural Department, who is required to report to the Board the progress made as a result of operations undertaken with the aid of the loan. This work is performed by the present staff of the Department in conjunction with their regular duties and during the year it was with difficulty and hindrance to other work that these systematic inspections could be carried out, owing in the first place to the resignation of the 1st Assistant Curator early in the year and secondly to the part time services of the 2nd Assistant Curator being acquired for Secretarial work by the Board.

No details regarding the administration of loans and the supervision of estates involved can be published, as such details are obviously of a strictly confidential nature.

From the general activity displayed it is evident that the financial assistance afforded, together with the Free Plant Distribution scheme will ensure a diversification of the Island's industries and a wider Agricultural outlook. This bids fair to ameliorate the period of economic depression which Dominica has experienced during the present decade, and it should usher in a new era of prosperity in the not far distant future.

GOMIER STEWART TRUST ESTATE.

During the year, approximately half of this estate was sold outright to the tenant who had originally rented the entire estate.

The remainder of the estate is occupied by 30 tenants at a rental of 10/- to 15/- per acre according to the quality of the land.

Two tenants were given notice to quit during the year for being in arrears with their rent and for failing to occupy their lands to the satisfaction of the Department. Officers of the Department pay periodical visits to the estate for the purpose of supervising and giving advice.

Despite serious damage to cultivations by the hurricane of September, 1928, the peasants have maintained their lands in good order and satisfactory progress has to be reported.

DETAILS OF ADMINISTRATION.

EXPENDITURE.

The local votes for the Agricultural Department for the year were as follows;—

					£	s.	d.
Salaries Curator, Assistant Curator, Clerk, Foreman and Watchman				...	1,187	17	9
Contingencies	...	...	...	...	13	0	0
Travelling Expenses	...	...	...	...	100	0	0
Maintenance	...	...	...	...	290	0	0
Cultivation Saleable Products & Minor Industries	...	...	...	...	325	0	0
Purchase Special Manures	...	...	...	...	120	0	0
Printing Reports etc.	...	...	...	...	40	0	0
Experiment Station	...	...	...	...	370	0	0
Chemicals and Apparatus	...	...	...	...	25	0	0
Telephone Rental	...	...	...	...	20	0	0
Upkeep of Horses and Mules	...	...	...	...	50	0	0
Agricultural Instruction	...	...	...	...	322	0	0
					£2,862	17	9

The actual expenditure during the year under the above heads was £2,522. 7. 11.

DETAILS OF ADMINISTRATION.

ADDITIONAL EXPENSES FOR SPECIAL SERVICES.

Grant for free distribution of economic plants ... £886 9 2½

R E C E I P T S.

						£	s.	d.
Limes	...	...	...	...	...	1,159	16	10
Cocoa	...	...	...	...	...	157	15	10
Plants	...	...	...	...	...	54	8	9½
Fruit	...	...	...	...	...	35	13	10
Nutmegs	...	...	...	...	...	10	17	0
Coconuts	...	...	...	...	...	10	5	6
Onion Seed	...	...	...	...	...	5	13	7
Vegetable Seed	...	...	...	...	...	3	19	2
Tobacco Seed	...	...	...	...	...		1	6
Tobacco	...	...	...	...	...		1	17 6
Miscellaneous	...	...	...	...	...		10	7 0
Laboratory Receipts	...	...	...	...	...		20	12 6
						£1,471	9	0½

STAFF CHANGES, ETC.

The Honourable F. G. Harcourt, Curator and Agricultural Superintendent, who proceeded on vacation leave on the 10th December, 1927, returned and resumed his duties on the 26th June, 1928.

Mr. J. W. Wright, Assistant Curator, resigned his appointment and left for the United Kingdom on the 17th September, 1928.

Mr. J. C. Bruney, Travelling Agricultural Instructor, resigned in June, 1928, to take up the post of manager at Moore Park Estate.

Mr. G. R. Cools-Lartigue was appointed Clerk to the Agricultural Department on the 1st August, 1928.

Mr. C. Alexander assumed duties as Assistant Foreman on the 1st October, 1928, consequently his post as Overseer was taken by Mr. J. S. Jean; but he left on the 1st December, 1928, to work as Overseer on the Goodwill Estate and Mr. G. J. Stedman assumed the duties of Overseer on the 1st December, 1928.

REPAIRS TO BUILDINGS, ETC.

Repairs were carried out to the Emsall entrance gate, the cocoa drier and one of the glass-houses. The cocoa store-room was completely re-roofed. A shelter and lock-up store were erected at the new Copt Hall nursery and premises near the Peasants' Information Bureau acquired and fitted as a fruit packing depot.

CORRESPONDENCE AND DISTRIBUTION OF INFORMATION ON AGRICULTURAL MATTERS.

Eight hundred and five letters were despatched from the Department's Office not including over two hundred and fifty bills. The number of Minute Papers dealt with excluding numerous Confidential and Loan Board Minute Papers was three hundred and eighty-one. The office work of the Department has increased to such an extent that much valuable time of the Senior Officers of the Department is utilised to cope with it.

Various pamphlets and copies of reports were distributed to planters interested.

PLANT AND SEED EXCHANGE.

Contributions of Seeds and plants were received from the following :—

Botanical Gardens Peradeniya, Botanical Gardens Antigua, Dr. A. G. Carment, W. A. Schipp, Esq., Tjonding Estates, Java, H. C. Sampson, Esq., C. I. E., Imperial Commissioner of Agriculture, Mrs. Parkhurst, Director of Agriculture, Jamaica, Dr. Barbour, U.S.A. Department of Agriculture, R. O. Williams, Esq., Trinidad. The Department tenders its

LABORATORY WORK.

best thanks for these welcome contributions.

Seeds and plants were sent to:—

Royal Botanic Gardens Kew, Department of Agriculture Porto Rico, Botanic Gardens Antigua, Imperial College Tropical Agriculture Trinidad.

OFFICIAL VISITS TO THE DEPARTMENT, ETC.

Professor H. Clark Powell visited the Island during the year on behalf of the Empire Marketing Board, to obtain information concerning the possibilities of Orange and Grapefruit cultivation. The Imperial Commissioner visited the Department in October and again in January. Professor S.F. Ashby of the Imperial Bureau of Mycology arrived in Dominica on the 7th February to investigate Root disease of limes. He left for Antigua on the 3rd March. The Government Chemist and Superintendent of Agriculture for the Leeward Islands visited the Department once during the year.

AGRICULTURAL INSTRUCTION AND VISITS TO ESTATES.

The class of six pupils was maintained through the year. During their two years course the pupils receive training in the general principles of Agriculture, special attention being taken to ensure their proficiency in all methods of propagation. The senior pupils were loaned to Estates to teach and assist in the budding and grafting of plants.

Meetings were held in all parts of the Island to instruct and stimulate planting activity amongst the Peasantry to further the objects of the Free Plant Distribution Scheme.

Frequent visits of inspection were paid to all Estates in receipt of loans.

The school teachers of the Island were given a week's course of lectures and practical demonstration in Agriculture during their summer vacation. The course was well attended, the lectures condensing the fundamental and elementary principles of Soil management, Propagation, Manuring, Pruning, School gardening etc. were given from 9 a.m. to 12 a.m. During the afternoons the class was conducted round the Botanic Gardens, Experiment Stations and Nurseries for the purpose of practical demonstration. The papers submitted at the end of the course showed that a marked interest had been taken.

The services of the Officers of the Department are always available when sought by planters and their thanks are tendered for the kind hospitality shown by planters during visits of inspection.

Instructional visits were also paid to the properties of the newly-formed Vegetable Growers Association, who are engaged in the growing and marketing of vegetables for export.

LABORATORY WORK.

Work in the Laboratory was again increased during the year, and the following tests were made by the Officers of the Department.

A small fee is charged for each test made.

Raw Lime Juice	....	....	....	14
Concentrated Lime Juice	....	....	....	30
Bay Oil	....	....	....	230
Other Oils	....	....	....	2

An attempt was made to investigate the nature of the oil from *Citrus aurantifolia*, but the quantity available proved too small to give reliable information.

In September, 1927, distillations of the "roots" of green ginger and the leaves of *Pogostemon Patchouli*, a wild herb obtained from the Giraudel district at 1d. per lb., were made by the Assistant Curator, and the oils obtained submitted to the Imperial Institute for a report. Owing to defects in the still, the yield in each case could not be taken as representative, but the method was similar to usual methods employed and should offer no difficulties on a commercial scale.

THE LIME INDUSTRY.

GINGER OIL.

The Specific Gravity figure was abnormally high, viz., 0.9012 as compared with 0.870 to 0.886 for the normal commercial product. Its solubility in alcohol was little more than half what is required by the trade. As the price of this oil ranged between 21/- and 32/- on the London market early in 1928, it would appear to warrant a further trial.

PATCHOULI OIL.

Leaves of *Pogostemon patchouli* were obtained from Giraudel, where this plant flourishes in the wild state.

Two samples were submitted, the physical constants comparing very favourably except in regard to solubility. The report concludes: "It is probable that patchouli oils similar to these samples in colour and odour would be saleable in the United Kingdom, probably at prices somewhat below those ruling for Singapore patchouli oil, which was recently quoted in London at 27/- per lb., spot. (May, 1928)."

THE LIME INDUSTRY.

The export figures for limes and lime products during the year 1928 show a decrease of 5,000 barrels when compared with the exports of the previous year. This decrease is attributable to the severe hurricane of September, 1928, and to the ravages of root disease which has resulted in the loss of thousands of bearing trees. A far greater falling off in output was anticipated, especially as no effective measures of control of root disease have been discovered, and areas are becoming badly devastated in consequence.

Previous reports of this Department have pointed out the superiority of the budded lime over seedlings, especially as regards resistance to high winds and to root troubles, to which the seedling lime is susceptible. This is now generally recognised, and several planters have established nurseries of their own and are propagating the lime on the sour orange stock. The Department has also extended its nurseries and made provision for meeting the urgent demand for this class of plant. Details of this work are given elsewhere in this report.

Although the quantity of lime products was less than the previous year, there was a marked increase in their value, due principally to increase of demand and a shortage of supply.

Ripe limes realised up to 15/- per barrel and green limes up to 30/- per barrel. The price for lime oils remained high, up to 64/- per lb. being obtainable for handpressed and 26/- per lb. for distilled.

THE LIME INDUSTRY.

The crop shipped since 1919, calculated in barrels of fruit and expressed in round numbers is recorded thus :—

			<i>Barrels.</i>	
1919	..	..	402,000	Prior to appearance of Withertip.
1920	..	..	369,000	
1921	..	..	516,000	
1922	..	..	400,000	
1923	..	..	228,000	Owing to carry over from (previous year.
1924	..	..	424,000	
1925	..	..	230,000	
1926	..	..	214,000	
1927	..	..	210,000	
1928	..	..	205,000	

The following table calculated on the usual basis* shows the disposal of the crop under various heads :—

Products.	Barrels of fruit.	Approximate percentage of total crop.
Concentrated lime juice.	136,096½	66. 1
Raw juice	40,812	19. 8
Fresh limes	26,830	13. 0
Pickled limes	225	.1
Lime juice cordial ...	1,853½	.9

The exports of products of the lime industry during 1928 is recorded below :—

Product.	Quantity.	Value £
Concentrated lime juice.	90,731 gallons	20,726
Raw lime juice	306,090 „	20,947
Lime juice cordial ...	337 „	51
Fresh limes	26,830 barrels	24,743
Pickled limes	225 „	472
Essential Oil (distilled)...	32,174 lbs.	37,192
Otto of limes (hand-pressed or ecuelled) ..	7,677 „	15,383
		£119,514

*50 gallons of concentrated juice represents 75 barrels of lime fruits: 7½ gallons of raw juice represents 1 barrel of lime fruits: 1 ton of citrate of lime is equivalent to 266 barrels of lime fruits: 1 ton of citric acid is equivalent to 400 barrels of lime fruits: 1 gallon of lime juice cordial represents 5½ barrels of lime fruits.

LIME VARIETIES.

LIME VARIETIES.

Of the many varieties of sour citrus introduced for the purpose of endeavouring to find a variety of the Lime immune to withertip disease, yet possessing qualities similar in every respect to those of the West Indian lime, Bear's Seedless, Tahiti, and Woglum's lime are still the most promising. These varieties, now growing on a field scale on Sherwood Estate, look particularly well, having made good growth and appear to like the wet conditions. All are budded on the sour orange stock and a few plants have already borne fruit. Woglum's lime appears to fruit much earlier than Bear's or Tahiti.

The few trees of these varieties growing in the Department's trial plots have been used principally for supplying budwood; consequently sufficient fruit has not been obtained to supply juice and oil for commercial tests. It is hoped that within the next year, with the help of fruit from Sherwood Estate, this will be undertaken and definite data obtained concerning these varieties.

KAGSI NIMBU LIME.

This lime, introduced from India, has proved to be susceptible to Withertip disease. The young plants resemble the West Indian lime very much in appearance.

DR. HARLAND'S LIME.

Two of the plants of sour citrus collected by Dr. Harland and received from the Imperial Department of Agriculture, have commenced to fruit. The fruits however are very large, in no way resembling the West Indian lime.

* * * *

Mention was made in last year's report of alcoholic extracts of the peels being made by the Assistant Government Chemist which were submitted to the Imperial Institute. Report has been received that extracts prepared in this manner could not be compared with the hand-pressed and distilled oils of commerce, and that it was not possible from the results of the examination of these samples to express an opinion as to the comparative values of the varieties of lime in question as sources of essential oil. It was recommended that a few ounces of hand-pressed or ecuelled oils prepared from the same varieties be forwarded for examination. This will be done as soon as sufficient oil can be obtained.

LIME HYBRIDS.

Since August 1927 a number of hybrids have been raised by cross-pollination of West Indian limes with various sour citrus considered to be immune to Withertip disease. Seeds which germinated were obtained from the following crosses, the female parent being first mentioned in each case:—

Woglum Lime	x	West Indian Lime	314 plants obtained from 38 crosses.
West Indian Lime	x	Woglum Lime	23 " " " 3 "
C. aurantifolia	x	West Indian Lime	188 " " " 23 "
West Indian	x	C. aurantifolia	13 " " " 1 "
Woglum Lemon	x	West Indian Lime	7 " " " 3 "
West Indian Lime	x	Rough Lemon No. 1	9 " " " 6 "
Eustis Limequat	x	West Indian Lime	1 " " " 1 "

The young plants, after receiving the usual nursery care, are planted on land recently acquired by the Department on Copt Hall estate, situated about two and a half miles from Roseau in an area where previous lime cultivations have become devastated through withertip disease. All the plants mentioned in the above table are budded or grafted on the sour orange stock, as many seedlings were lost through root disease soon after being planted out in the field. They look particularly healthy, being about 2 to 3 feet in height and showing considerable variation both in habit and vegetation. It is also observed that the crosses generally are practically free from withertip, although West Indian limes planted near by for the purpose of comparison are heavily affected.

The Woglum lime x West Indian lime crosses are likely to prove of particular interest in view of the qualities of the fruits of both parents so closely approximating. It is, however, much too early to draw conclusions as to the result of this work. Through the good offices of the Trinidad Department of Agriculture a number of plants representing the progeny of a cross between C. aurantifolia and the West Indian lime have been received and planted in the Department's trial grounds. These plants are growing well and resemble very much in appearance our local crosses.

MINOR INDUSTRIES.

MINOR INDUSTRIES.

FRUIT INDUSTRY.

The planting of young fruit trees is proceeding and there is a healthy demand for budded plants of Grapefruit and Oranges, and also for Grafted Mangoes.

More attention is being paid to bearing cultivations and exports are steadily increasing although the hurricane of the 13th September caused considerable damage to the year's crop.

During the year Professor H. Clark Powell of the Transvaal University, who has been visiting various countries on behalf of the Empire Marketing Board, spent ten days in Dominica, and was very favourably impressed with the possibilities of grapefruit cultivation in the Island. He explored a good deal of the island and expressed the opinion that not only were the soils in general very suitable, but there was little need for the use of commercial fertilizers as fertility could be well and cheaply maintained by mulching.

In his address to the local Agricultural and Commercial Society he laid special emphasis on the care that was necessary from the very start, viz. selection of site, careful selection of budwood, use of good nursery trees, mulching, and the handling and marketing of the fruit. Dominica should be able to produce grapefruit at a very low cost and from information he had gathered it appeared that growers would be able to place grapefruit on the London and Canadian markets at a cost probably lower than any other part of the Empire. He also informed the meeting that he was of opinion that there was more suitable land for grapefruit growing in Dominica than anywhere else in the West Indies, and also made it clear that it was not a crop adapted to cultivation by peasants. It was emphasised, too, that if Dominica wished to extend its production of grapefruit, the growers would have to give their cultivations far better care and attention than is at present being given to the West Indian lime.

The following extract from "Grapefruit Culture in the British West Indies and British Honduras" by Professor H. Clark Powell, and published by the Empire Marketing Board summarises the position in Dominica at the present time:—

"The island is admirably suited to the development of a large grapefruit industry, having a suitable climate and an abundance of good grapefruit soil.

"The present production of grapefruit is about 500 boxes a year. A small increase will take place in the next two or three years, but there is little likelihood of any marked expansion under present conditions. Grapefruit cultivation should be confined to those areas where lime growing is no longer possible. The grapefruit is not attacked by withertip and when budded on the sour orange root stock, as it should be, is immune to 'red-root.'

"Although Dominica is pre-eminently adapted to grapefruit cultivation on a large scale, it does not seem likely that any great development will take place in the near future as there are practically no individuals in the island who can carry out the planting. Climatic conditions are suitable, the grapefruit thriving under rainfall as high as 200 inches, soil conditions are excellent and shipping facilities exist for the transport of the fruit to England or Canada, but there is a complete lack of local people with the necessary capital to start the industry."

Planters in Dominica can be supplied with a copy of this publication on application to the Agricultural Department.

Since the Professor's visit the local government has passed an Ordinance to regulate the examination and exportation of fruit and to prohibit the shipment of defective fruit. This ordinance repeals the Exportation of Fruit Ordinance of 1926 and provides for one or more central packing houses, where all fruit for export, except limes for New York, shall be graded and packed under Government supervision.

Bermuda continues to furnish Dominica with a ready market for common mangoes, avocado pears and oranges. Much of the trade is in the hands of owners of comparatively small estates employing no regular agent at either end, although there are shippers in Roseau who have gradually built up a steady export. Nevertheless, complaints are made from time to time of partial or total losses due to sudden gluts with a consequent drop in price, or to fruit being received in very poor condition, if not actually rotten.

MINOR INDUSTRIES.

It is hoped to remedy this state of affairs by co-operative measures, and the proposal that one responsible agent at Roseau and one at Hamilton be appointed is shortly to be considered. Foreseeing an improvement in what is already a profitable minor industry, many planters are already being supplied with good varieties of grafted plants of the above-mentioned fruits.

COCOA.

Cocoa plantations were very badly damaged by the hurricane experienced in September. In the valleys the high winds were seemingly of greater intensity than in the open country and hundreds of cocoa trees were blown over, the majority being a total loss. Damage was so great that it is feared that the export of cocoa for the coming year will be reduced by almost 50%.

Much activity has been demonstrated by planters and peasants in extending the area under this crop and the demand for planting material has been readily met by the Department.

COFFEE.

In the reports for the past two years the increased interest shown by planters and peasants in the possibilities of coffee cultivation in Dominica has been noted. This interest has now taken a decidedly practical turn and a very lively demand for planting material has faced the department during the past year.

Several growers decided to make plantings of *Coffea stenophylla* and several thousands of young plants have been distributed. This species is hardy and prolific, with small leaves and a fairly dwarf, spreading habit.

It is suitable for cultivation at low elevations and the trees in the economic section of the Botanic Gardens bear prolifically and appear immune to leaf miner.

Very fine specimens have also been observed growing at an elevation of 2,000 feet.

The Robusta variety is also in considerable demand, especially by the peasantry.

In addition, *San Ramon* and *Excelsa* coffees are being given a trial by planters.

The export of coffee for 1928 was 1,669 lbs. as compared with 1,106 lbs. for the previous year.

COCONUTS.

A large number of plants were distributed from the nurseries which are situated in various parts of the Island. Estates in the Lassoie district have concentrated their attention on coconut cultivation since the advent of withertip disease of limes, and under this leadership the peasantry have also planted considerably, having in view the possibility of the disposal of their crops to these estates. The elementary stage in the production of copra has already been passed, and copra of excellent quality is now being regularly shipped to overseas markets.

Considerable damage was caused to last year's crop by the September hurricane and in some localities many trees were destroyed.

Despite this damage there was again a big increase in the export of copra, 189,366 lbs. being shipped during 1928 as against 140,393 during the year 1927.

There was also a corresponding increase in the export of dried nuts.

VANILLA.

During the year under review activity in this industry was more pronounced and the exports more than doubled those of the previous year. This is a sure indication as to the growth of this minor industry, especially as fertilization was not heavy in view of the low prices ruling. Many peasant proprietors are now more interested in preparing their own products than in selling their green vanillas to local dealers, so that the following notes issued by the Imperial Institute on the curing of vanilla may be of special interest at the present time.

CURING OF VANILLA.

The drying and curing of the pods of vanilla are of much practical importance, since they have a great effect on the value of the final product. If left to ripen on the plant, the pod, which is at first green, gradually turns yellow (beginning at the lower end) and splits

open. It continues to darken, changing through brown to black, and takes about a month to ripen fully. The characteristic vanilla odour, which is not present in the freshly-ripened pod, develops as the pods darken. If left to themselves the pods dry up and become brittle and odourless.

The object of the artificial methods of curing that are employed is to accelerate the ripening and to render it uniform throughout the length of the pod, and also, by arresting the natural vegetative processes, to prevent the splitting of the pod which entails loss of perfume.

METHODS USED IN MEXICO.

(1) *Sun Curing.*

Sun curing is the ordinary method of curing adopted in Mexico. The pods are picked when they are just beginning to turn yellow at the end; if allowed to remain on the plant beyond this stage there is a risk that they may split. The pods are then spread out in single layers on shelves ("Camillas") in a clean place, which is well ventilated and protected from rain, and are left for 24 hours during which they lose moisture and shrivel. During this stage they are kept under observation and sorted according to their degree of ripeness; those pods that show a tendency to blacken being smeared thinly with castor oil.

The next day the pods are spread out on tables in the sun, preferably alongside a whitened wall facing south. The tables are covered with sacking, on which are placed woollen blankets, of a dark colour (to converse the heat) and on these the pods are spread out, singly, with their thick ends towards the sun.

Before sunset, the pods, which are now almost too hot to handle, are placed in boxes. These boxes have themselves stood all day in the sun, and are lined with blanket material that has also been similarly exposed. The pods are piled in the boxes with their thick ends in the centre of the box, and the blanket lining is folded over the top of the pile. In this condition, with every precaution to conserve the heat, the pods undergo the process known as "sweating." After 16-24 hours they have usually acquired a dark brown colour and are removed from the boxes, any pods that have remained green being set aside and treated in ovens. (See Oven Curing.)

The pods are then allowed to dry for a period which may last from 20-30 days, according to the weather. During this period they are placed on the camillas, advantage being taken of fine days to expose them to the sun for one or two hours at the hottest part of the day. They are also subjected again during this period to the sweating process some 4 to 5 times; this number should not be exceeded or the pods may become soft and discoloured.

(2) *Oven Curing.*

The curing of vanilla by sun heat is only possible in fine weather. If the weather is unfavourable, recourse is had to the oven method of treatment, which, indeed, is stated to be used increasingly in place of the sun process. The oven process requires close attention and skill in order to avoid loss of material through faulty curing.

The pods are tied up in bundles, of flat rather than cylindrical shape, each consisting of from 100-400 pods. Each bundle is wrapped in a woollen covering, then enclosed in sacking, and tied up with cord. The bundles are then placed in an oven.

The oven has been previously heated, and the fire removed, the temperature at which the treatment commences being 89°C. to 125°C. according to the number of bundles to be treated (the larger the number the higher the temperature.) An average number of bundles to be treated at a time is from 16-20, for which the commencing temperature would be 111°C. to 115°C. The oven should be made to cool as slowly as possible. It is recommended that, if it is not in frequent use, the oven should be kept at a high temperature for some time before use, and in any case, it should first be heated to a higher temperature than that at which it is to be used, and then allowed to cool to the required temperature, a thermometer being placed in the middle of the oven to indicate when this temperature is attained.

The oven being at the correct temperature the bundles are rapidly introduced, by means of a rod having a hook at its end, and the oven is then closed.

After 16-24 hours the pods have generally acquired the proper colour, though it is a common practice after 12 to 14 hours to remove and examine one bundle in order to gauge the further length of treatment necessary. Should the temperature have become too low,

MINOR INDUSTRIES.

the oven is re-heated, the bundles being temporarily removed. Or less satisfactory, the bundles may remain in the oven, being protected by damp sacking.

When the bundles are finally removed from the oven, they are wrapped in blankets in order that they may cool very slowly. The next day they are exposed in the sun or on the camillas, according to the weather. For a subsequent 20-30 days the pods are dried in the same way as described under "sun curing," and are "sweated" 4 or 5 times.

During the drying process the pods are carefully inspected, and any that are misshapen or unripe, or that have split open, or show mould or abnormal crystallisation, are separated and placed in different classes according to their particular defects.

Finally the pods are graded according to colour, firmness and length, they are made up into packets of 50, and packed in tin boxes, each box containing 60 packets all of the same grade.

METHODS USED IN OTHER COUNTRIES.

In the French islands of Madagascar and Réunion a process that is commonly employed is treatment with hot water. This is known as the "boiling water" process, as when it was originally introduced the water was employed at a temperature near its boiling point. At present a temperature of 60°C. to 65°C. is regarded as more satisfactory.

The pods are placed in baskets according to grades, and the baskets are dipped into a cauldron of hot water for 2-3 minutes according to the grade, the larger pods having the longer treatment.

An alternative to this treatment is exposure to steam, the pods being placed on a perforated shelf over water near its boiling point, the whole being contained in a closed vessel.

In either case the pods are afterwards immediately transferred (after being allowed to drain for a few moments, and while still hot) to sweating boxes similar to those already described. They are then exposed in the sun for 6-8 days until they reach the proper condition and are finally allowed to dry slowly in the shade in a well ventilated drying house.

Less elaborate methods are used in other countries. Thus in Peru the pods are immersed in boiling water and hung up to dry in the open air. After drying for some twenty days they are smeared with castor oil and tied up in bundles.

NUTMEGS.

Nutmeg growing is not an important minor industry at the present time, but if the considerable numbers of young plants distributed by the Department during the last two years are well cared for, it will develop into one of importance in the future.

BAY OIL.

This industry is steadily growing and considerable exportations of oil are now being made.

The Bay tree succeeds best on the dry lands of the Windward coast.

CHIEF EXPORTS.

CHIEF EXPORTS.

TABLE OF AGRICULTURAL EXPORTS FOR THE TRIENNIAL PERIOD
1926 TO 1928.

	1926.	1927.	1928.
<i>Lime Products:</i>			
Concentrated juice ...	104,014 galls.	106,971 galls.	90,731 galls.
Raw juice ...	268,760 "	173,848 "	306,090 "
Lime juice cordial ...	2,275 "	845 "	337 "
Distilled oil ...	33,471 lbs.	31,346 lbs.	32,174 lbs.
Ecuelled oil ...	9,381 "	7,828 "	7,677 "
Green limes ...	21,171 brls.	21,578 brls.	27,065 brls.
Pickled limes ...	536 "	263 "	225 "
<i>Cocoa Products:</i>			
Cocoa ...	727,034 lbs.	684,550 lbs.	572,348 lbs.
Prepared cocoa ...	1,149 "	139 "	417 "
<i>Coffee Products:</i>			
Coffee ...	2,446 lbs.	1,104 lbs.	1,669 lbs.
<i>Coconut Products:</i>			
Coconuts ...	187,794	236,553	253,817
Copra ...	109,037 lbs.	140,393 lbs.	189,366 lbs.
<i>Sugar Products:</i>			
Rum ...	26 galls.	544 galls.	403 galls.
Syrup ...	100 "	—	110 "
<i>Spices:</i>			
Vanilla ...	2,537 lbs.	1,226 lbs.	2,964 lbs.
Nutmeg ...	1,543 "	459 "	£10 worth
Ginger ...	22,914 "	9,864 "	£312 "
<i>Honey Products:</i>			
Honey ...	5,005 lbs.	4,924 lbs.	120 lbs.
Bees wax ...	30 "	238 "	—
<i>Various Products:</i>			
Bananas ...	10,034 bunches	8,828 bunches	3,394 bunches
Oranges ...	693 brls.	908 brls.	460 brls.
Mangoes ...	6,456 crates	4,734 crates	5,985 crates
Grapefruit ...	410 "	727 "	729 "
Pears ...	1,720 "	£406 worth	{ £1,053 worth }
Miscellaneous fruits ...	88 "	—	
Bay oil ...	10,745 lbs.	9,692 lbs.	13,407 lbs.
Orange oil ...	805 "	2,638 "	742 "
Kola nuts ...	£8 worth	£20 worth	1,800 "
Cassia Fistula ...	£1 "	—	—
Tamarinds ...	58 brls.	11 brls.	23 brls.
Vegetables ...	£69 worth	£157 worth	£52 worth
Farine ...	—	£33 "	£90 "
Hides & Skins ...	£74 "	£75 "	£87 "
Leather unmanufactured ...	1,299 lbs.	1,619 lbs.	2,633 lbs.
Plants, seeds, bulbs ...	£2 "	£10 worth	£4 worth
Fruits, jams, jellies ...	£337 "	£595 "	£17 "
Turtle shells ...	271 lbs.	318 lbs.	150 lbs.
Baskets ...	£1 worth	£4 worth	£6 worth
<i>Forest Products:</i>			
Hardwood ...	37,678 ft.	79,575 ft.	68,299 ft.
Firewood ...	605 cords	993 cords	601 cords
Canoe shells ...	119	53	64 "
Shingles ...	13,000 bundles	£3 worth	£5 worth
Charcoal ...	15,090 lbs.	9,520 lbs.	7,087 lbs.
Locally made boats ...	20	£30 worth	—
Total values ...	£143,430	£155,806	£190,622

SUMMARY OF LEGISLATION AFFECTING CROPS.

The first step in the direction of plant protection was taken in 1898 when Act No. 3 was passed to provide against the importation of articles likely to introduce diseases among plants. Under the authority of this act, a Proclamation dated August 27, 1898, prohibited the importation from Ceylon of plants, seeds, berries, earth and soil. This Act was suspended by Law No. 9 of 1904, in which provision is made for the fumigation and disinfection of imported plants, cuttings, buds, grafts, bulbs, roots and seeds, and their packages; also fruit and vegetables intended for propagation, and not for consumption as food.

Under Law No. 6 of 1907 power is conferred to prohibit by proclamation the importation of plants, cuttings, bulbs, roots, seeds or berries, or any earth or soil, or any articles packed therein, or any packages, or other articles or things likely to be the means of introducing any plant disease.

A Proclamation dated February 5, 1909, under No. 6 of 1907, prohibits the importation into Dominica of all plants from Dutch Guiana, which are likely to be the means of introducing disease from that country.

A Proclamation dated October 23, 1910, prohibits the importation of banana plants and suckers from all countries of Central or South America, and from the island of Trinidad; also of coconuts in husk, and all growing plants of coconuts, from Cuba, Jamaica, Trinidad and all countries of Central and South America.

A Proclamation dated October 9, 1916, restricts under certain conditions, the entry of rooted plants of all kinds from the United States of America, Cuba, Jamaica, Haiti, San Domingo, and Porto Rico.

A Proclamation dated October 26, 1917, prohibits the importation of seed cotton or cotton seed from all countries or places outside the Colony of the Leeward Islands, save and except from some other Presidency of the Colony, or from the Colony of Trinidad and Tobago and its dependencies, or from the Colonies of Grenada, St. Vincent, and St. Lucia, provided, however, that small quantities of cotton seed for experimental purposes may be imported into the Presidency of Dominica, on the written permission of the Superintendent of Agriculture on such terms and conditions as he may prescribe.

A Proclamation dated December 21, 1920, prohibits the importation of sugar-cane from any other country into this Presidency, for the time being.

A Proclamation dated January 28, 1923, prohibits the importation of Johnson Grass (*Holcus halepensis*) from any other country into this Presidency.

A Proclamation dated January 28, 1923, prohibits the importation of banana plants, (suckers) from all countries except other Leeward Islands, Grenada, St. Vincent, and Barbados.

A Proclamation dated December 24, 1923, prohibits the importation of coconuts and coconut plants from any other country into this Presidency until further orders.

A Proclamation dated May 4, 1925, prohibits the importation of Banana plants (suckers) into this Presidency from all countries except other Leeward Islands, St. Vincent, and Barbados, without the written permission of the Governor.

A Proclamation dated July 27, 1925, prohibits the importation of citrus plants from all countries except Windward and Leeward Islands, Trinidad and Tobago, and Barbados. It is, however, allowed that the Curator or Agricultural Officer shall have the power to import for scientific purposes anything thus prohibited, on his making a report of such importation for the information of the Governor.

An Ordinance, No. 23 of 1925, regulates the examination, curing and exportation of Vanilla and also prohibits certain dealings with the same.

An Ordinance dated September 18, 1925, regulates the examination, curing and exportation of Tobacco.

With regard to the export of plants, it is only necessary to state that such cannot be admitted into the United States of America unless accompanied by a certificate showing that they have been inspected by a duly authorized official, and are found free from injurious plant diseases or insect pests.

Ordinance No. 3 of 1926 regulates the Examination and Exportation of fruit likewise prohibiting the shipment of defective fruit.

Ordinance No. 2 of 1927 for the prevention and eradication of Diseases and Pests affecting vegetation provides for (1) the appointment of Inspectors (2) registration and inspection of nurseries.

METEOROLOGICAL RETURN.

RAINFALL RETURNS, DOMINICA, 1928.

STATIONS.		JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCTOBER.	NOV.	DEC.	TOTALS.
1. Bagatelle, Soufrière	W ...	4.66	5.70	4.80	2.57	2.43	10.34	7.45	12.40	10.81	7.12	9.08	5.60	82.93
2. Batalie	L ...	2.19	2.03	2.95	5.54	1.54	3.81	8.46	14.58	15.59	4.54	3.45	1.59	63.27
3. Bellevue *	I ...													
4. Blenheim	LAS.	7.75	5.55	7.69	4.85	5.09	6.19	7.88	10.55	23.61	13.76	16.22	15.51	124.65
5. Botanic Gardens	L ...	6.60	4.25	6.30	4.16	2.25	6.68	6.58	12.80	8.10	4.35	7.93	5.38	75.38
6. Canfield	L ...	5.23	3.03	5.75	3.27	1.80	6.18	7.64	15.22	10.43	4.40	7.90	5.16	76.01
7. Castle Bruce	W ...	10.30	10.82	23.28	11.03	16.20	16.67	12.92	18.76	35.80	26.46	28.91	38.97	250.12
8. Clark Hall	L ...	7.67	5.86	9.78	5.77	2.95	10.45	11.20	16.23	14.55	6.60	7.67	8.76	107.49
9. Everton *	L ...													
10. Fontaine	I ...	9.72	9.61	13.38	7.89	6.61	9.68	12.17	14.29	23.87	11.62	15.57	14.61	149.02
11. Goodwill	L ...	7.48	4.05	6.28	3.07	1.19	8.17	6.88	13.72	9.18	4.92	8.27	5.69	78.90
12. Governor	W ...	6.13	6.14	10.43	9.32	8.00	8.54	8.57	12.68	30.80	12.56	29.43	21.37	163.97
13. Hampstead	LAS.	3.83	3.65	5.76	4.23	4.35	4.32	7.30	9.87	36.21	8.51	20.25	13.41	121.72
14. Hillsborough *	L ...													
15. Londonderry	LAS.	3.68	3.73	4.12	3.35	2.55	4.67	5.35	7.26	19.77	9.80	17.74	14.72	96.74
16. Moore Park *														
17. Morne Bruce	L ...	8.08	5.03	8.00	5.15	2.83	7.74	8.00	13.94	9.31	4.93	9.66	6.60	89.27
18. Picard	L ...	8.95	5.34	8.03	5.16	2.06	7.33	10.24	13.98	12.62	7.68	7.22	11.94	100.55
19. Pte. Mulâtre	W ...	5.17	4.40	9.95	7.37	5.89	7.65	7.59	12.97	14.77	14.91	11.95	17.53	120.15
20. Rosalie	W ...	8.99	5.10	9.16	7.20	7.03	8.88	7.40	12.81	14.50	14.80	20.67	20.41	136.95
21. Shawford	I ...	19.78	15.65	25.86	13.80	4.99	16.64	22.11	32.46	44.79	16.40	28.80	19.01	260.29
22. Sherwood	I ...	19.10	17.42	21.24	14.42	5.83	17.47	18.87	20.80	28.44	13.65	18.25	20.56	216.05
23. Soufrière	L ...	4.39	7.45	7.60	3.84	5.11	11.18	9.42	14.32	13.88	10.66	12.27	7.80	107.92
24. Stowe	W ...	6.78	7.05	9.14	6.16	5.43	9.79	10.08	12.81	19.94	10.94	12.93	12.23	123.28

* Records destroyed by hurricane of 12th Sept.

Mean Rainfall 20 Stations ...

127.23 inches.

8 Leeward Stations...
 6 Windward
 3 Inland
 3 Lasoye

87.35
 146.23
 208.45
 114.37

METEOROLOGICAL RETURN.

RAINFALL AT THE BOTANIC STATION, DOMINICA, 1909-1928.

Month.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	Monthly Mean Rainfall.
January ...	2'30	5'20	11'46	8'21	7'48	3'22	1'76	10'79	5'00	6'02	2'42	7'54	6'82	6'50	3'82	6'25	7'88	3'68	5'50	6'60	5'89
February...	5'02	11'42	4'00	1'32	2'32	5'56	1'04	1'90	4'10	8'73	1'52	4'76	1'02	4'30	2'30	1'90	1'95	2'46	4'50	4'25	3'72
March ...	2'08	1'16	3'11	4'60	7'29	2'23	0'84	4'52	6'74	3'32	0'69	3'80	4'46	2'80	3'46	0'66	3'50	'96	5'37	6'30	3'39
April ...	8'12	2'86	5'00	3'38	1'57	6'45	15'75	1'22	0'47	1'86	2'36	'22	3'06	2'26	3'77	1'46	'40	2'77	4'67	4'16	3'59
May ...	1'92	7'30	11'16	1'56	3'46	2'58	3'65	2'05	2'94	5'90	4'60	2'38	1'54	2'64	0'13	3'18	2'76	2'44	6'69	2'25	3'55
June ...	9'00	14'26	6'54	5'44	3'49	7'27	9'17	4'82	15'34	6'04	3'88	3'48	1'96	7'14	4'18	4'42	5'80	5'76	15'03	6'68	6'99
July ...	9'86	12'60	8'08	5'83	7'57	11'83	14'84	8'23	13'70	11'28	12'64	12'08	11'18	6'08	8'20	13'64	6'23	10'14	9'61	6'58	10'01
August ...	13'12	10'22	11'43	4'88	10'93	3'98	14'74	16'58	8'53	8'46	9'64	8'76	9'30	9'26	11'44	11'28	13'88	10'10	4'65	12'80	10'19
September.	6'44	8'90	15'34	3'32	8'39	7'71	11'36	6'20	15'02	4'14	7'06	8'60	6'28	10'68	4'28	4'88	9'12	4'12	6'20	8'10	7'81
October ...	13'10	3'82	7'06	7'26	10'40	5'13	8'41	10'06	2'46	6'67	7'50	12'60	9'41	2'63	9'84	10'98	12'55	5'86	8'84	4'35	7'94
November.	4'36	5'40	6'91	11'20	4'28	9'44	10'05	14'28	1'92	3'36	9'02	4'62	2'44	3'00	1'06	6'86	9'60	7'54	8'70	7'93	6'59
December..	5'82	7'50	7'14	6'66	2'72	9'70	8'40	3'77	4'58	5'86	6'70	5'62	4'22	6'90	1'92	13'65	2'02	3'75	1'37	5'38	5'68
Total ...	81'44	90'64	97'26	63'72	69'90	75'10	100'01	83'42	80'80	71'46	68'03	74'46	61'72	64'24	54'40	79'16	75'69	59'58	81'13	75'38	75'35

Average year = 75'85 inches.

METEOROLOGICAL RETURN.

METEOROLOGICAL REGISTER KEPT AT THE BOTANIC GARDENS, DOMINICA.

1928. Months.	THERMOMETER.				Relative Humidity.		Thermometer.		Barometer Corrected. <i>Reduced to 32° Fh Sea Level.</i>	Rainfall.	Barometer Corrected.		THERMOMETER.		REMARKS.	
	Dry.		Wet.								Highest.	Lowest.	Highest.	Lowest.		
					9 a.m.	3 p.m.	9 a.m.	3 p.m.		Max.						Min.
January	77.5	79.5	72.8	71.0	79.6	64.8	82.1	67.5	30.01	29.92	6.60	30.08	29.84	89	63	
February	76.2	79.5	70.5	71.2	73.0	68.7	85.3	68.4	30.03	29.95	4.25	30.13	29.88	89	65	
March	72.7	79.5	71.2	71.5	74.6	62.6	84.0	71.0	30.03	29.95	6.30	30.16	29.86	88	65	
April	79.7	81.7	71.6	71.7	63.7	56.7	89.2	69.1	29.99	29.95	4.16	30.05	29.81	90	65	
May	83.4	84.4	73.5	73.5	61.3	59.4	92.2	68.7	30.03	29.93	2.25	30.05	29.89	95	67	
June	83.8	83.7	74.7	74.5	57.3	58.4	92.3	71.4	29.98	29.94	6.68	30.05	29.89	95	68	
July	82.7	83.9	72.8	75.5	60.0	63.7	89.8	69.6	29.96	29.95	6.58	30.04	29.92	92	65	Thunderstorm, 18th.
August	81.0	82.5	75.5	75.5	73.1	70.0	90.4	71.4	28.98	29.92	12.80	30.04	29.86	92	67	
September	81.1	83.3	76.0	76.9	75.4	72.0	88.8	72.9	29.92	29.85	8.10	30.02	29.37	92	71	Hurricane, 12th
October	81.3	83.0	76.0	76.1	75.5	70.3	89.2	72.1	29.94	29.86	4.35	30.01	29.76	93	69	
November	79.8	82.3	75.0	76.0	77.2	70.8	87.5	71.1	29.91	29.85	7.93	30.00	29.78	89	68	
December	76.9	80.3	72.7	73.7	79.6	69.8	85.5	69.7	29.96	29.88	5.38	30.04	29.78	89	68	
ANNUAL, 1928.	79.6	81.9	73.5	73.9	70.8	65.6	88.02	70.2	29.95	29.91	75.38	30.05	29.80	91	68	

Highest Maximum Temperature = 95° on May 22nd.

Lowest Minimum Temperature = 63° on January 25th.

" Barometer (Corrected) = 30.16 " March 7th.

" Barometer (Corrected) = 29.37 " September 12th.

Greatest Rainfall in 24 hours = 4.50 inches on August 7th.

MEAN ANNUAL TEMPERATURE = 79°

APPENDIX I.

151/29.

PEASANTS' INFORMATION BUREAU,
4th June, 1929.

SIR,

I beg to submit the following report on the Peasants' Information Bureau for the financial year 1928-29.

2. I attach a statement showing the quantity and value of produce dealt with from 1st April, 1928, to 31st March, 1929.

The total receipts during the period amounted to £1,738. 0. 1½ and the payments to £1,934. 16. 0. The credit balance brought forward from previous year being £292. 6. 5. The balance carried forward was £95. 10. 6½. These figures include receipts and payments for the growing and marketing of vegetables by the peasants, since transferred to the Committee of the Vegetable Growers Association.

3. Up to the time of the hurricane in September, 1928, the shipping of produce by the Bureau showed signs of expansion. The hurricane, however, which destroyed most of the Peasants' crops seriously curtailed the quantity of produce, and normal conditions have not yet been restored.

4. *Bay Oil.* This is the only product in which there has been a fair amount of business since the hurricane. During the course of the year it became apparent that peasants were not getting the benefit of the increased value of the commodity in the English and American markets. Efforts made to induce the regular dealers to increase the local price met with little success, and it became necessary to control the situation by taking charge of peasant-produced oil and shipping it. The financial gain to the peasants was considerable, amounting in most cases to about £4 per tin of 39 lb. weight over and above what would have been received had the oil been sold locally.

5. The result of control has been that the local dealers will now pay the Bureau what I consider to be a full price for the oil. Some recent lots have been disposed of locally at prices which have left to the trader only a reasonable profit. It will be necessary, however, for some time at least, that these sales should be transacted through the Bureau.

6. *Farine.* Owing to the destruction by the hurricane of all bananas, plantains and breadfruit, and to a large extent of the root crops, on all of which the peasants chiefly subsist they have been forced to consume more farine and this commodity therefore, which is usually produced in quantity in excess of local demand, has been meeting with ready sale at enhanced prices and there has been no surplus to export. Since September last farine has never sold for less than 8d. per pot (2 quarts) whereas previously the price seldom rose above 6d. per pot.

7. *Grapefruit.* During the latter part of the year several shipments of grapefruit were made to London, Manchester and Halifax, Nova Scotia. The results of these shipments I regret to say were very disappointing. 268 boxes were shipped to Messrs. Munro & Co. of Covent Garden Market, 101 cases to the same firm's branch in Manchester and 263 cases to Messrs. John Tobin & Co., Halifax, N.S. The consignees in every case reported that the fruit which arrived sound was of exceptionally good quality and that the grading and packing were far better than in any of our previous shipments. The percentage of loss was however, very high, and owing to overstocked markets, the prices realised were very low. The shipments to Halifax realised an average of 9/- nett per case. London prices ranged from 7/- to 16/- and Manchester prices from 13/- to 16/-, in each case for repacked crates of sound fruit. These extremely low prices coupled with the unusually heavy loss of fruit in transit left nett proceeds which in some cases did not cover the local charges.

8. To account for the high percentage of loss is difficult, but it is believed that notwithstanding its fine appearance before shipment the fruit must have undergone some change as a result of the hurricane of September, 1928, which militated against its keeping qualities. To some such cause it is undoubtedly attributable as never before has such great care been taken in the selection, curing and packing of the fruit, and shipments made during the previous year showed only a very small percentage of loss.

9. During the hurricane most of the grapefruit crop was blown off the trees and of what remained the greater part continued to fall off prematurely during the next month or

two, so it is reasonable to suppose that even the fruit that remained on the trees and which to all appearance was quite sound had undergone some slight physiological change which resulted in unusually early decay. This I believe is the view held by the Agricultural Superintendent and in that view I fully concur.

10. As regards markets it is apparent that the only way to secure better prices is to get the fruit shipped earlier, and this is a matter which presents some difficulty. Possibly an advance of the crop period may in some measure be secured by the use of suitable fertilizers. Careful manurial experiments will be necessary and I have no doubt this will receive the attention of the Agricultural Superintendent.

11. *Syrup.* Owing to the largely increased consumption of locally made duty paid rum there has for some time past been an unusually active demand for syrup for the manufacture of rum and peasants have been obtaining in the local market highly remunerative prices, ranging from 1/6 to 2/- per Imperial gallon. The violent fluctuations in this market have hitherto acted as a deterrent to the peasants to extend the area under sugar cane. Recently, however, on the initiative of His Honour the Administrator, the rum distillers were got together at a meeting held at the Peasants' Information Bureau for the purpose of discussing means by which the price of syrup might be stabilized. The conclusions arrived at at that meeting were :—

(a) That it was highly desirable in the interests of the island and of the peasants that the peasantry should grow more sugar cane.

(b) That if distillers could agree among themselves to fix the selling price of rum at 3/6 per gallon the price of syrup could also be stabilized at 1/6 per gallon, and that it was desirable in the interests both of the Peasantry and of themselves that that should be done.

(c) That in order to create the confidence necessary to get the peasantry interested in the scheme the distillers should enter into contracts with the Peasants' Adviser providing for the purchase by them of peasant-produced syrup at the price named, up to a limit of quantity, and that the Peasants' Adviser should on his part use his influence to induce the Peasants to plant the necessary area with sugar cane.

12. No definite agreement was entered into but the sense of the meeting was distinctly favourable to the proposals, and, from conversations which I have recently had with some of the principal rum distillers they are likely to materialise. The realisation of this project would be of very great benefit to the peasants and every effort will be made to secure its adoption.

13. *Green Vegetable Growing.* In August, 1928, a meeting of such of the smaller proprietors as were likely to be interested in the growing of fine vegetables for export was held at the Peasants' Information Bureau and a scheme propounded by His Honour the Administrator for the production of such vegetables as cabbages, carrots and turnips, with Government Assistance received enthusiastic support.

14. Pending sanction by the Secretary of State to an allocation of funds from the Imperial Loan for financing the scheme the Peasants' Adviser was authorised to make a start with money advanced from the Peasants' Information Bureau. These advances were subsequently refunded from an allocation made from Imperial Loan funds.

15. The initial assistance to the Peasants consists of making small cash advances for cultivation and providing them with seeds and manure at cost price to be paid for on the sale of their produce. The work of supervising these plots, widely scattered as they are, in a mountainous country, has been very difficult, but it may be said with few exceptions the peasants have proved to be industrious and they have shown good results. Some who have proved unreliable have been excluded from further participation in this scheme which now includes ninety-two peasants and small cultivators. This is more than can properly be supervised and a process of weeding out will I think be found necessary especially in view of the limited funds available.

16. In October last I was directed to proceed to Demerara via the Islands en route, to get details as to the requirements of their markets and to establish agencies for the disposal of the vegetables. In the course of this trip I visited St. Lucia, St. Vincent, Grenada, Barbados, Trinidad and Demerara. In the first three of these Islands I found that the small local markets were fully supplied with home grown vegetables, but in Barbados, Trinidad and Demerara, the prospects for the successful establishment of the industry appeared to be highly favourable. I was informed that from October to February vegetables such as we propose to grow were imported in large quantities from Canada and the United States

and were sold at prices against which we were not likely to be able to compete, but that from March to October the markets were unusually bare of supplies, and prices rose considerably. At the time of my visit cabbages were being retailed in the Georgetown market at 9d. per lb. and the wholesale price was about 5d. per lb. and the price of other vegetables e.g. carrots, turnips and beet, was about the same. In Trinidad the same conditions were found but their prices, both wholesale and retail, were from $\frac{1}{2}$ d. to 1d. less than in Demerara. In Barbados prices were generally lower, but as Cold Storage is unnecessary between Dominica and Barbados the nett value to the producer was about the same. The situation in Barbados was, however, complicated by the fact that the retail sale of green vegetables is principally carried on by Hucksters who obtain their supplies from itinerant traders who travel from island to island. It was impossible to establish contact with these people and the local grocers were unwilling to make any effort to disturb the existing arrangement. Eventually, however, I succeeded in interesting one of the largest firms of grocery and provision dealers who agreed to do our marketing. The Agencies arranged for were:—

In Barbados: The Barbados Meat and Ice Supply Co.

In Trinidad: The Government Ground Provisions Depot.

In Demerara: Messrs. Bookers Amalgamated Groceries Limited.

The Barbados Meat and Ice Supply Co., however, very early decided to discontinue acting as our agents and we are now represented by Mr. John Shannon, a keen and energetic business man of Bridgetown who has been very favourably reported on and who is very much interested in pushing the business.

17. Vegetables have been produced in abundance and of most excellent quality, but the marketing of them has been extremely difficult and still continues to be difficult. It appears that most of the Islands, even those where conditions were most unfavourable for the production of fine vegetables, awakened simultaneously to what they thought were the possibilities of the green vegetable business, and the small intercolonial markets have been flooded with vegetables most of them of very poor quality. This has had the effect of depressing prices to such an extent, that there has been no profit in the business for anyone. So far the highest prices obtained have been 3d. per lb. for cabbages and 2 $\frac{1}{2}$ d. per lb. for carrots and turnips, and, owing chiefly to high cold storage freight rates, it costs about 2d. per lb. to land cabbages in Demerara and Trinidad. This leaves an insufficient margin to cover the high costs of production and transport to port of shipment.

18. In ^{other} order directions e.g. watching the interests of the peasants, keeping them informed of fluctuations in local prices of produce, supplying them with fertilizers and assisting them in various other ways, the work of the Bureau has functioned normally.

19. *Crops and Markets.* There is every indication that the cocoa crop will be a good one and the crop of limes now on the trees throughout the Island is heavier than it has been for several years past. The value of Concentrated Lime juice on the London market has advanced from £25 to £30 per pipe. The value of essential lime oil in the local market is now 65/- per lb. and of distilled oil 26/- per lb. The markets appear to be stable with a tendency to rise. Owing to the revolution in Mexico and the shortage of supplies here coupled with an active demand in New York the price of green limes in the local market recently reached the phenomenal figure of 50/- per barrel unwrapped. Plantation limes were sold up to 55/- per barrel. With the crop rapidly maturing the price has fallen to about 20/- per barrel for peasant-grown limes, but this is well ahead of the price at the same date in previous years. What effect the proposed new duty in the United States amounting to an increase of \$2.00 per barrel will have on the lime market remains to be seen, but it is not improbable that the duty will be paid by the consumers as it has been hitherto.

20. The prices of limes and lime products quoted above taken altogether are higher than have ever been recorded in the history of the industry, and as the peasants rely chiefly for their living on the successful marketing of their lime crop a prosperous year for them as well as for the larger planters is assured unless we experience some disaster such as occurred last year.

I have the honour to be,

Sir,

Your obedient servant,

J. C. MACINTYRE,

Peasants' Adviser.

APPENDIX.

PEASANTS' INFORMATION BUREAU.

STATEMENT OF PRODUCE DEALT WITH BY THE PEASANTS'
INFORMATION BUREAU FOR YEAR APRIL 1ST, 1928,
TO 31ST MARCH, 1929.

<i>Produce.</i>	<i>Quantity.</i>	<i>Cost or estimated value of produce.</i>
Cocoa	25 bags 27 lbs.	£ 86 16 0
Coconuts	18 „	15 0 0
Coffee	75 lbs.	2 3 9
Copra	1 „	1 10 0
Cinamon	8 „	3 0
Ginger—dry	4 „	7 14 11
Ginger—green	144 „	8 7
Lime Juice—Concentrated	32 Casks	341 19 7
Lime Juice—Raw	1 „	1 4 6
Limes—Green	72 barrels	106 15 7½
Limes—Ripe	44 „	26 15 4
F R U I T :		
Grapefruit	658 Crates	201 7 4½
Mangoes & Pineapples	48 „	20 18 4
Lemons	31 „	22 1 10½
Avocado Pears	76 „	110 15 10
Oranges	37 „	28 18 1½
O I L S .		
Bay Oil	33 Tins	361 8 3
Orange Oil	½ „	9 10 8
O T H E R .		
Vanillas	35¼ lbs.	7 3 0
Honey	8 Cases	8 0 0
Beeswax	1 Case	5 0 0
		£1,365 14 9

APPENDIX II.

The following MEMORANDUM issued by the British Ministry of Agriculture is reproduced as being of general interest, in view of extensive damage on Estates by this pest in Dominica.

RED SQUILL AS A RAT POISON.

The Ministry advocates the use of red squill poison in baits intended for the destruction of rats and mice, in preference to other stronger poisons sometimes used, such as strychnine, arsenic and phosphorus. Red squill is particularly recommended for use on farms and in places where, owing to the presence of poultry, live-stock, domestic animals or stored food supplies, special care is necessary.

Red squill poison is extracted from the red squill bulb (*Urginea maritima*) which grows on the sandy shores of the countries bordering the Mediterranean Sea. It may be used in powdered or liquid form in baits consisting of bread (or oatmeal), fat, syrup and a few drops of aniseed, or in biscuit or other forms supplied by firms who deal in rat destruction preparations and appliances.

From experiments recently carried out on behalf of the Ministry, the following general conclusions were arrived at:—

- (a) Female rats are killed by doses of red squill approximately only half as great as those generally needed to kill male rats.
- (b) The finer the red squill powder is ground the more toxic it becomes.
- (c) The best red squill baits for general use are those made from a finely ground and completely dried product of the bulb itself.
- (d) The average lethal dose for male and female rats is, approximately, .50 and .27 grammes respectively.
- (e) The white squill (used for medicinal purposes) is useless as a rat poison.

A series of experiments was also carried out with calves, sheep, pigs and rabbits, which were given red squill powder in their feed, and, in spite of the fact that they had been given no other food for the preceding 24 hours, it was found almost impossible to induce the animals to eat any appreciable quantity of the poisoned feed. It would appear, therefore, that on the grounds of palatability alone, there is little danger of such animals eating a sufficient quantity of red squill baits to cause ill effects. In those cases where the animals were induced to take the poison, it was found that unless a considerable quantity of the poison was consumed no ill effects were noticed. Experiments with fowls showed that they took the poison more readily, but even then it was found that to kill a fowl required a dose between 20 and 30 times as large as that necessary to kill a rat.

These experiments appear to show that, while fatal to rats, red squill poison is comparatively harmless to larger animals, and Rat Officers are urged to consider the desirability of using preparations containing this toxic agent, particularly in those cases where domestic animals and poultry are kept in the vicinity.

